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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/055,608	01/23/2002	Wolfgang Singer	637.0017USU	6642

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EXAMINER

PRITCHETT, JOSHUA L

ART UNIT PAPER NUMBER

2872

DATE MAILED: 03/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/055,608

Applicant(s)

SINGER ET AL.

Examiner

Joshua L Pritchett

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 26-51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 26-28, 31-33, 37, 41-48, 50 and 51 is/are rejected.
- 7) ☒ Claim(s) 29, 30, 34-36, 38-40 and 49 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Objections

Claims 30, 42, 45 and 48-49 are objected to because of the following informalities: the claims include reference to "said light source" this structure limitation lacks antecedent basis. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 26, 32-33, 37, 41-43, 48 and 50-51 are rejected under 35 U.S.C. 102(e) as being anticipated by Chapman (US 6,186,632).

Regarding claim 26, Chapman discloses a collector for guiding light of wavelength less than or equal to 193 nm onto a plane (col. 4 lines 22-25). Extreme Ultraviolet lithography deals with wavelengths less than 193 nm. Chapman further discloses a first and second mirror shell

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for receiving a first and second ring aperture section of said light and irradiating a first and second planar ring section of said plane with a first and second irradiance (Fig. 6, 608).

Chapman further discloses the first and second mirror shells are rotationally symmetrical and concentrically arranged around a common axis of rotation (Fig. 6, 608). Chapman further discloses the first and second ring apertures do not overlap one another (Fig. 6, 608). Chapman further discloses the first ring section substantially abuts the second ring section (Fig. 6, 608). Chapman further teaches the first irradiance is approximately equal to the second irradiance. Chapman makes no reference to altering the incident light in any way other than to change the direction (col. 7 lines 3-15) therefore the intensity of the light exiting both ring sections would be the same.

Regarding claim 28, Chapman discloses the first mirror shell is an inner shell and the second mirror shell is an outer shell (Fig. 6, 608). Chapman discloses that a point used to define the location of the second shell is further from the axis of rotation than a point used to define the location of the first shell (Fig. 6, 608).

Regarding claim 32, Chapman discloses the first and second mirror shell are each a ring-shaped segment of an aspherical object (col. 6 lines 61-63).

Regarding claim 33, Chapman discloses the first and second mirror shells are formed in an ellipsoid (col. 6 lines 61-63).

Regarding claim 37, Chapman discloses wherein the first and second ring aperture segments are separated by a gap (Fig. 6, 608)

Regarding claim 41, Chapman discloses wherein the first and second mirror shells are two of a plurality of mirror shells comprising at least three mirror shells (Fig. 6, 608).

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Regarding claim 42, Chapman discloses the light source emits rays that impinge with the angle of incident of less than 20 degrees to surface tangents of the first and second mirror shells (col. 6 line 66 – col. 7 line 2).

Regarding claim 43, Chapman discloses an illumination system using the collector (Fig. 6).

Regarding claim 48, Chapman discloses an illumination system wherein the system comprises a second plan conjugated to the light source between the collector and the first plane in which an intermediate image of the light source is formed (Fig. 6, 610).

Regarding claim 50, Chapman discloses an EUV projection system with a mask and a projection objective (col. 4 lines 33-45).

Regarding claim 51, Chapman discloses a process for producing a microelectronic device comprising EUV projection exposure (col. 4 lines 33-45).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 27 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chapman in view of Amos (US 5,369,511).

Chapman teaches the invention as claimed but lacks reference to the first and second shells having different dimensions in the direction of the rotational axis. Amos teaches the first and second shells having different dimensions in the direction of the rotational axis (Fig. 20). It would be within the skill of one ordinarily trained in the art to make each of the shells larger or smaller depending on the desired design. It would have been obvious to a person of ordinary skill in the art to have the Chapman shells have different dimensions in the direction of the axis of rotation as taught by Amos for the purpose of having better defined rings on the image plane.

Claims 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chapman in view of Schultz (US 6,198,793).

Regarding claims 44 and 45, Chapman teaches the invention as claimed but lacks reference to the use of raster elements. Schultz teaches the use of raster elements in EUV lithography (col. 2 lines 39-40). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Chapman collector contain the raster elements taught by Schultz for the purpose of providing extra versatility to the EUV lithography design.

Regarding claim 46, Chapman teaches the illumination system has a second optical element for imaging (Fig. 6, 610).

Regarding claim 47, Chapman teaches the second optical element is used for field shaping (col. 7 lines 7-8).

Allowable Subject Matter

Claims 29-30, 34-36, 38-40 and 49 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 29 and 30, the prior art of record failed to teach or suggest the claimed ratios cited as limitations to the current invention.

Regarding claims 34-36, the prior art of record failed to teach or suggest the segments of the mirror shells having different shapes.

Regarding claims 38 and 40, the prior art or record failed to teach or suggest the claimed limitations on the numerical apertures of the current invention.

Regarding claims 39 and 49, the prior art of record failed to teach or suggest the use of diaphragms in the process of EUV lithography.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Cole (US 4,015,120) teaches imaging rings on a detecting plate.

Levine (US 6,389,101) teaches the use of a collector in X-ray imaging.

Sweatt (US 6,469,827) teaches the use of multiple mirrors shaped into a ring in the process of EUV lithography.

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Sweatt (US 6,285,737) teaches the use of multiple mirror grazing arrays in the process of EUV lithography.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joshua L Pritchett whose telephone number is 703-305-7917.

The examiner can normally be reached on Monday - Friday 7:00 - 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on 703-308-1687. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

JLP
February 13, 2003


James Phan
Primary Examiner